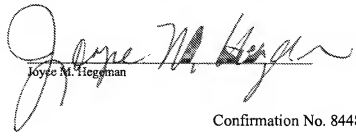
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

I hereby certify that this correspondence is being electronically filed with the United States Patent and Trademark Office on October 29, 2008. at or before 11:59 p.m. Pacific Time under the Rules of 37 CFR § 1.8.



Applicant	:	Kim, Jin-Sung	Confirmation No. 8448
Application No.	:	10/718,478	
Filed	:	November 18, 2003	
Title	:	ELECTROLYTE FOR LITHIUM SECONDARY BATTERY AND LITHIUM SECONDARY BATTERY COMPRISING SAME	
Grp./Div.	:	1795	
Examiner	:	Robert W. Hodge	
Docket No.	:	51545/P849	

APPELLANT'S BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Post Office Box 7068
Pasadena, CA 91109-7068
October 29, 2008

Commissioner:

1. REAL PARTY IN INTEREST

The real party in interest is Joint Assignee, Samsung SDI Co., Ltd. and Cheil Industries, Inc.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. STATUS OF CLAIMS

Claims 1-4, 8, 10, 11, 13, 15 and 17 are pending in the application, and claims 5-7, 9, 12, 14, 16 ans 18 stand withdrawn from consideration. All of pending claims 1-4, 8, 10, 11, 13, 15

and 17 have been rejected. The rejection of each of claims 1-4, 8, 10, 11, 13, 15 and 17 is appealed.

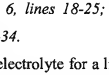
4. STATUS OF AMENDMENTS

This appeal is taken from a final Office Action of May 21, 2008, which responds to a Response filed on March 5, 2008.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1-4, 8, 10, 11, 13, 15 and 17 have been rejected and are appealed. Of these claims, claims 1, 11 and 15 are independent. Claim 1 is directed to an electrolyte for a lithium secondary battery comprising a non-aqueous organic solvent, and a vinyl sulfone. *Claim 1; page 4, lines 11-20; page 5 line 16 to page 6, line 2; page 7, lines 15-23.* The vinyl sulfone is present in the electrolyte in an amount ranging from 0.05 to 0.5 wt% based on the total weight of the electrolyte. *Claim 1; page 7, lines 15-23.* The vinyl sulfone may also be present in the electrolyte in an amount ranging from 0.2 to 0.5 wt% based on the total weight of the electrolyte. *Claim 2; page 7, lines 15-23.* The vinyl sulfone may be present in the electrolyte in an amount ranging from 0.3 to 0.5 wt% based on the total weight of the electrolyte. *Claim 3; page 7, lines 15-23.* The non-aqueous organic solvent may be a mixed solvent including a cyclic carbonate and a linear carbonate. *Claim 4; page 24-28.* The electrolyte may further include gamma butyrolactone in an amount ranging from 10 to 30 parts per volume based on 100 parts per volume of the non-aqueous organic solvent. *Claim 8; page page 8, lines 11-15.* The non-aqueous organic solvent may comprise ethylene carbonate and a linear carbonate selected from dimethyl carbonate (DMC), diethyl carbonate (DEC), methylethyl carbonate (MEC) and mixtures thereof. *Claim 10; page 6, lines 18-25; page 7, line 23 through page 8, line 10; Examples 11-10 on page 8, lines 18-34.*

Claim 11 is directed to an electrolyte for a lithium secondary battery comprising a non-aqueous organic solvent, and a sulfone based organic compound represented by the following Formula (I):



(I)

In Formula I, R and R' are independently selected from alkenyl groups and halogen substituted alkenyl groups. *Claim 11; page 4, lines 11-20; page 5, line 16 through page 6, line 2.* The sulfone based organic compound is present in the electrolyte in an amount ranging from 0.05 to 0.5 wt% based on the total weight of the electrolyte. *Claims 11 and 1; page 7, lines 15-23.* The sulfone based organic compound may be vinyl sulfone. *Claim 13; page 5, line 29 through page 6, line 2; Examples 2, 7 and 8 in Table 1 at page 8, lines 18-34.*

Claim 15 is directed to an electrolyte for a lithium secondary battery comprising a non-aqueous organic solvent, and a sulfone based organic compound represented by the following Formulae (I), (II), and (III), and mixtures thereof:


(I)

(II)

(III)

In Formulae I, II and III, n is from 0 to 3, and R and R' are independently selected from primary alkyl groups, secondary alkyl groups, tertiary alkyl groups, alkenyl groups, aryl groups, halogen substituted primary alkyl groups, halogen substituted secondary alkyl groups, halogen substituted tertiary alkyl groups, halogen substituted alkenyl groups, and halogen substituted aryl groups. *Claim 15; page 4, lines 1-20; page 5, line 16 through page 6, line 2.* The amount of the sulfone based organic compound ranges from 0.1 to 5 weight% based on the total amount of electrolyte. *Claim 15; page 6, lines 3-10.* The sulfone based organic compound may be selected from methyl sulfone, vinyl sulfone, phenyl sulfone, 4-fluorophenyl sulfone, benzyl sulfone, tetramethylene sulfone, and butadiene sulfone. *Claim 17; page 5, line29 through page 6, line2; Examples 1-10 at page 8, lines 18-34.*

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether the examiner erred in rejecting claims 1-4, 8, 10, 11, 13, 15 and 17 under 35 U.S.C. §102(b) as anticipated by Hamamoto, et al. (JP 11-329494).

7. ARGUMENT

In the Final rejection dated May 21, 2008, the examiner rejected claims 1-4, 8, 10, 11, 13, 15 and 17 under 35 U.S.C. §102(b) as anticipated by Hamamoto, et al. (JP 11-329494).

I. Rejection of claims 1-4, 8, 10, 11, 13, 15 and 17 under 35 U.S.C. §102(b)

In maintaining the rejection of claims 1-4, 8, 10, 11, 13, 15 and 17 as allegedly anticipated by Hamamoto, the examiner argues that Hamamoto "completely overlaps the instantly claimed ranges and shares a same exact end point," and that Hamamoto therefore discloses the claimed ranges with sufficient specificity to be anticipatory. Applicant respectfully traverses this argument.

To be anticipatory of the claimed ranges, Hamamoto must disclose the recited ranges with "sufficient specificity" to constitute an anticipation under the statute. *See* MPEP §2131.03 (II). Indeed, MPEP §2131.03 (II) notes that "[i]f the claims are directed to a narrow range, and the reference teaches a broad range. . ., it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims." Here, Hamamoto discloses very broad ranges encompassing numerous values far exceeding those covered by the ranges recited in the present claims. In particular, as noted in applicant's previous responses, Hamamoto discloses the presence of a vinyl sulfone derivative in an electrolytic solution in an amount ranging from 0.1 to 10 wt% or from 0.01 to 20 wt%. See paragraphs 0013 and 0014. Hamamoto discloses no additional ranges of amounts of the vinyl sulfone derivative and does not disclose ranges similar to the 0.05 to 0.5 wt% range of vinyl sulfone or the 0.1 to 5 wt% range of a sulfone based organic compound recited in the present claims. That Hamamoto may completely encompass one of the recited ranges does not constitute a disclosure with sufficient specificity to be anticipatory. *See Atofina v. Great Lakes Chem. Corp.*, 78 U.S.P.Q.2d 1417, 1423 (Fed. Cir. 2006). In *Atofina*, the prior art reference disclosed a broad temperature range of 100 to 500°C, but failed to disclose the claimed 330-450°C range with sufficient specificity to be anticipatory, even though the disclosed range completely encompassed the claimed range. *Id.*

The present case is directly analogous to *Atofina v. Great Lakes Chemical Corp.* 78 U.S.P.Q.2d 1417 (Fed. Cir. 2006), cited above and in applicant's previous responses. As seen from *Atofina*, although a range taught by the prior art reference may encompass part, or even all of the recited range, the recited range is not anticipated if the prior art reference fails to disclose the recited range with "sufficient specificity." Here, as in Atofina, although Hamamoto discloses

a range that may overlap a small portion of the recited range, Hamamoto fails to disclose the recited range with "sufficient specificity" to be anticipatory. In particular, although Hamamoto discloses broad ranges of 0.1 to 10 wt% or from 0.01 to 20 wt%, Hamamoto fails to describe the recited 0.05 to 0.5 wt% range of vinyl sulfone recited in independent claims 1 and 11 or the 0.1 to 5 wt% range of the sulfone based organic compound recited in independent claim 15 with sufficient specificity to be anticipatory. Therefore, independent claims 1, 11 and 15 are not anticipated by Hamamoto.

In addition, as noted in applicant's previous responses, independent claims 1, 11 and 15 are not obvious over Hamamoto because the use of vinyl sulfone or the sulfone based organic compound in amounts within the claimed ranges exhibits unexpected and desirable results. As noted in the present specification, at page 6, lines 3-10, the effect of inhibiting the generation of gas inside a battery is not likely when the sulfone based organic compound is used in an amount of less than 0.1 wt%, and initial charge and discharge efficiencies and cycle life performance of the battery are decreased in accordance with the increase in the amount of compound used when the sulfone based organic compound is used in an amount exceeding 10 wt%. Also, the specification at page 7, lines 15-23 notes that when the vinyl sulfone is used in an amount between 0.05 and 0.5 wt%, initial capacity, discharge capacity at low temperature, high rate cycle life characteristics, and swelling inhibition properties are improved. Further, as shown in Fig. 2 and disclosed at page 12, lines 8-16, rates of increase in the thicknesses of the batteries after charging are lower when the content of vinyl sulfone is in the range of 0.1 to 5 wt%, and the rate of increase in thickness is much greater when the vinyl sulfone content is greater than 5 wt% (see Fig. 2 showing a much greater thickness variation ratio for the battery including vinyl sulfone in an amount of 10 wt%). Additionally, as shown in Fig. 3 and disclosed at page 12, lines 17-26, greater improvements in initial capacity and low temperature characteristics are achieved when the content of vinyl sulfone is in the range of 0.1 to 5 wt% compared to when the vinyl sulfone content is outside that range. Moreover, as shown in Fig. 4 and disclosed at page 12, line 27 to page 13, line 2, greater improvements in high rate cycle life characteristics are achieved when the vinyl sulfone is used in a range of 0.1 to 0.5 wt% compared to when the vinyl sulfone is used in amounts outside that range. Given these unexpected and desirable results with

respect to the range disclosed in Hamamoto, independent claims 1, 11 and 15 are not obvious over Hamamoto. Applicant therefore requests reconsideration of the May 21, 2008 Final rejection.

8. CLAIM APPENDIX

1. An electrolyte for a lithium secondary battery comprising:

a non-aqueous organic solvent; and

a vinyl sulfone

where the vinyl sulfone is present in an amount from 0.05 to 0.5 wt% on the basis of total weight of the electrolyte.

2. The electrolyte for a lithium secondary battery according to claim 1, wherein the vinyl sulfone is present in an amount from 0.2 to 0.5 wt% on the basis of total weight of the electrolyte.

3. The electrolyte for a lithium secondary battery according to claim 2, wherein the vinyl sulfone is present in an amount from 0.3 to 0.5 wt% on the basis of total weight of the electrolyte.

4. The electrolyte for a lithium secondary battery according to claim 1, wherein the non-aqueous organic solvent is a mixed solvent of a cyclic carbonate and linear carbonate

5. (Withdrawn) The electrolyte for a lithium secondary battery according to claim 1, wherein the non-aqueous organic solvent is a mixture of the carbonate solvents and aromatic hydrocarbon solvents of Formula (IV):

(IV)

wherein R1 is a halogen or a C_1 to C_{10} alkyl, and n is an integer from 0 to 6.

6. (Withdrawn) The electrolyte for a lithium secondary battery according to claim 5, wherein the aromatic hydrocarbon solvents are selected from the group consisting of benzene, chlorobenzene, nitrobenzene, fluorobenzene, toluene, trifluorotoluene, xylene and mixtures

thereof.

7. (Withdrawn) The electrolyte for a lithium secondary battery according to claim 1, wherein the non-aqueous organic solvent is a mixture of cyclic carbonate, linear carbonate, and aromatic hydrocarbon solvents of Formula (IV), which are mixed in a volume ratio of 10-40: 40-80: 5-40:

(IV)

wherein R1 is a halogen or a C_1 to C_{10} alkyl, and n is an integer from 0 to 6.

8. The electrolyte for a lithium secondary battery according to claim 1, wherein the electrolyte further includes gamma butyrolactone in an amount from 10 to 30 parts per volume on the basis of 100 parts per volume of the non-aqueous organic solvent.

9. (Withdrawn) An electrolyte for a lithium secondary battery comprising:

a non-aqueous organic solvent comprising cyclic carbonate, linear carbonate, and aromatic hydrocarbon solvents of Formula (IV), which are mixed in a volume ratio of 10-40: 40-80: 5-40;

(IV)

wherein R1 is a halogen or a C_1 to C_{10} alkyl, and n is an integer from 0 to 6;

gamma butyrolactone in an amount from 10 to 30 parts per volume on the basis of 100 parts per volume of the non-aqueous organic solvent; and

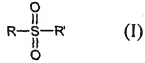
a vinyl sulfone in an amount from 0.05 to 0.5 wt% on the basis of total weight of the electrolyte.

10. The electrolyte for a lithium secondary battery according to claim 1, wherein the non-aqueous organic solvent comprises ethylene carbonate and a linear carbonate selected from the group consisting of dimethyl carbonate (DMC), diethyl carbonate (DEC), methylethyl carbonate (MEC) and mixtures thereof.

11. An electrolyte for a lithium secondary battery comprising:

a non-aqueous organic solvent; and

a sulfone based organic compound represented by the following Formula (I):



(I)

where R and R' are independently selected from the group consisting of an alkenyl group and a halogen substituted alkenyl group, wherein the sulfone based organic compound is present in an amount from 0.05 to 0.5 wt% on the basis of total weight of the electrolyte.

12. (Withdrawn) The electro yte or a lithium secondary battery according to claim 11, wherein the halogen selected from the group consisting of fluoro, chloro, bromo, and iodo.

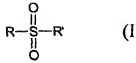
13. The electrolyte for a lithium secondary battery according to claim 11, wherein the sulfone based organic compound is vinyl sulfone.

14. (Withdrawn) A lithium secondary battery comprising:

an electrolyte comprising a non-aqueous organic solvent and a sulfone based organic compound represented by the following Formula (I) ;

a positive electrode including lithium-transition metal oxides as a positive active material; and

a negative electrode including carbon, carbon composite, lithium metal, or lithium alloy as a negative active material:



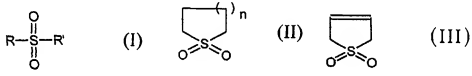
(I

where R and R' are independently selected from the group consisting of an alkenyl group and a halogen substituted alkenyl group.

15. An electrolyte for a lithium secondary battery comprising:

a non-aqueous organic solvent; and

a sulfone based organic compound represented by the following Formulae (I), (II), and (III), and mixtures thereof:



where R and R' are independently selected from the group consisting of primary alkyl groups, secondary alkyl groups, tertiary alkyl groups, alkenyl groups, aryl groups; halogen substituted primary alkyl groups, halogen substituted secondary alkyl groups, halogen substituted tertiary alkyl groups, halogen substituted alkenyl groups, and halogen substituted aryl groups, and n is from 0 to 3, wherein the amount of the sulfone based organic compound is from 0.1 to 5 weight% based on the total amount of electrolyte.

16. (Withdrawn) The electrolyte for a lithium secondary battery according to claim 15, wherein the halogen is selected from the group consisting of fluoro, chloro, bromo, and iodo.

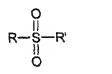
17. The electrolyte for a lithium secondary battery according to claim 15, wherein the sulfone based organic compound is selected from the group consisting of methyl sulfone, vinyl sulfone, phenyl sulfone, 4-fluorophenyl sulfone, benzyl sulfone, tetramethylene sulfone, and butadiene sulfone.

18. (Withdrawn) A lithium secondary battery comprising:

an electrolyte comprising a non-aqueous organic solvent and a sulfone based organic compound selected from the group consisting of compounds represented by the following Formulae (I), (II), and (III), and mixtures thereof;

a positive electrode including lithium-transition metal oxides as a positive active material; and

a negative electrode including carbon, carbon composite, lithium metal, or lithium alloy as a negative active material:



(I)

(II)

(III)

where R and R' are independently selected from the group consisting of primary alkyl groups, secondary alkyl groups, tertiary alkyl groups, alkenyl groups, aryl groups; halogen substituted primary alkyl groups, halogen substituted secondary alkyl groups, halogen substituted tertiary alkyl groups, halogen substituted alkenyl groups, and halogen substituted aryl groups, and n is from 0 to 3, wherein the amount of the sulfone based organic compound is from 0.1 to 5 weight% based on the total amount of electrolyte.

9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDING APPENDIX

None.

Respectfully submitted,

CHRISTIE, PARKER & HALE, LLP

By _____
David A. Plumley
Reg. No. 37,208
626/795-9900

LES/les

JMH PAS820528.1-*-10/29/08 12:38 PM